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Science 4

Waste and Our World

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Waste and Our World

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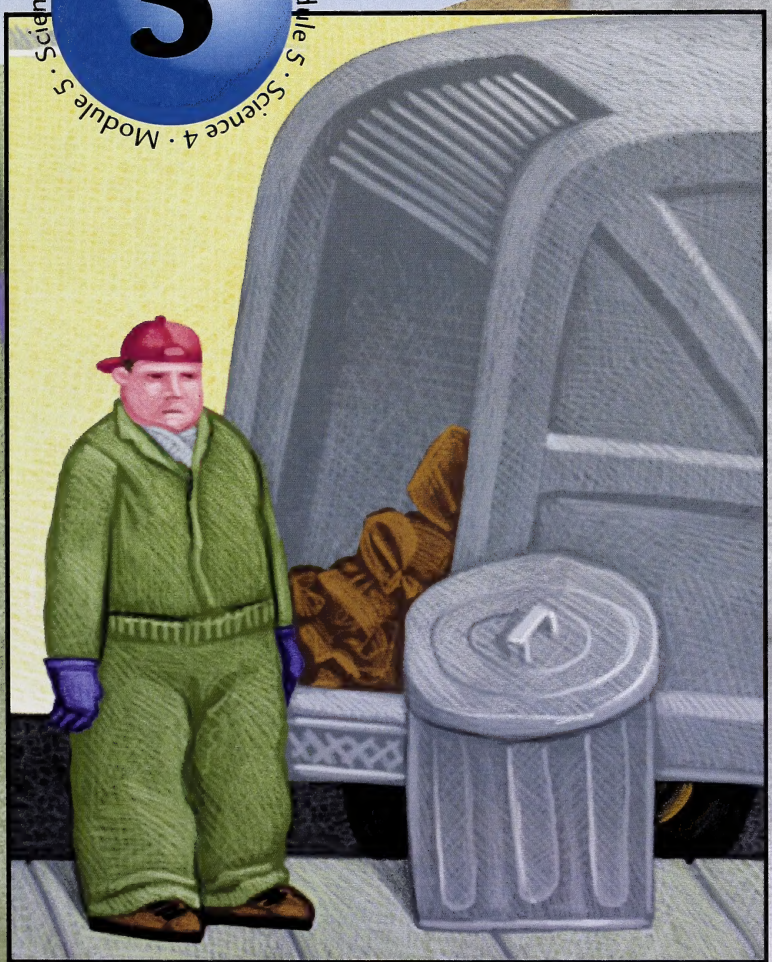

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Science 4
Module 5: Waste and Our World
Student Module Booklet
Learning Technologies Branch
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The Learning Technologies Branch acknowledges with appreciation the Alberta Distance Learning Centre and Pembina Hills Regional Division No. 7 for their review of this Student Module Booklet.

This document is intended for	
Students	✓
Teachers	✓
Administrators	
Home Instructors	✓
General Public	
Other	

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- Alberta Education, **http://www.education.gov.ab.ca**
- Learning Technologies Branch, **http://www.education.gov.ab.ca/ltb**
- Learning Resources Centre, **http://www.lrc.education.gov.ab.ca**

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Welcome

to Module 5 of Science 4

Module 1
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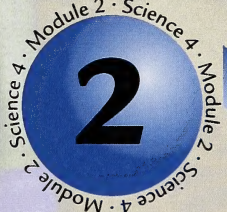
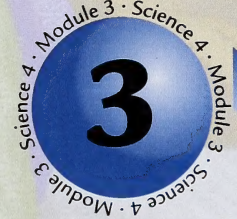


Module 2
Building Devices and Vehicles That Move



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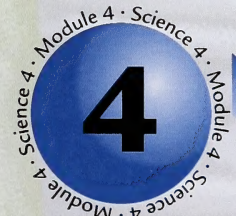
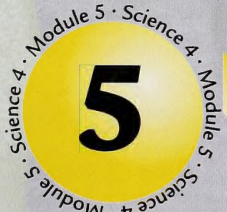
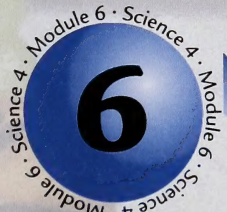
Light and Shadows



Module 4
Plant Growth and Changes



Module 5
Waste and Our World



Module 6
Relationships

There are six modules in this course. It is recommended that you work through the modules in order because the concepts and skills introduced in one module will be reinforced, extended, and applied in later modules.

Module 1 contains general information about the course components, additional resources, icons, assessment, and strategies for completing your work. If you do not have access to Module 1, contact your teacher to obtain this important information.

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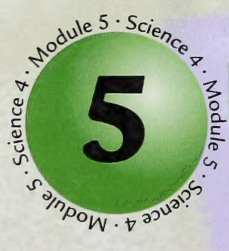
Module Overview

Canada is a huge country with many natural places. Canada is known around the world for its wonderful wilderness areas of prairies, tundra, forests, mountains, lakes, and rivers. Canadians are lucky to be able to enjoy so much wilderness, but there are also problems in the environment.

Like all countries around the world, Canada has air, water, and land pollution problems.

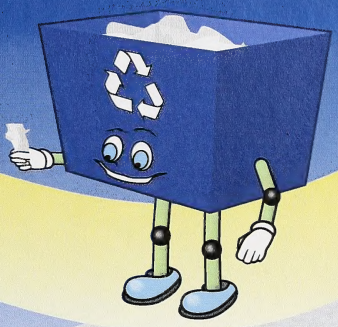
In this module you will find out about plant and animal waste, human-made waste, water waste, and pollution on land. You will also discover how you can make a difference.



Module 5
Waste and Our World

Section 1
Natural and Human-Made Waste

Section 2
Pollution Solutions



How Will You Be Marked?

Your mark on this module will depend on how well you complete the two Assignment Booklets.

This is how the marks are distributed:

Assignment Booklet 5A	
Section 1 Assignment	35 marks
Total	35 marks
Assignment Booklet 5B	
Section 2 Assignment	77 marks
Total	77 marks

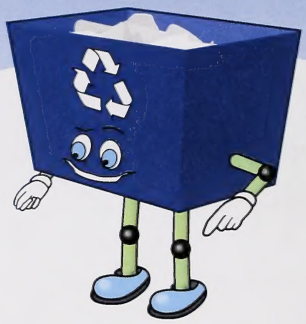
Be sure to check with your teacher to see if this mark distribution is appropriate for you. Some teachers like to include other reviews and assignments. When you get the assignments back from your teacher, be sure to read the comments and talk about them with your home instructor.

When you do the assignments, work slowly and carefully under the instruction of your home instructor or teacher. You may use your course materials to help you, but you must do the assignments by yourself.

Section 1

Natural and Human-Made Waste

Introduction



Look around you and see how clean and healthy our environment seems. You may be surprised to discover that Canadians are surrounded by waste and pollution. Even mountain streams that look clean may be unsafe for drinking.

In this section you will find out about the waste that plants and animals create on a daily basis. You will compare this type of waste to human-made waste and the pollution it can create.

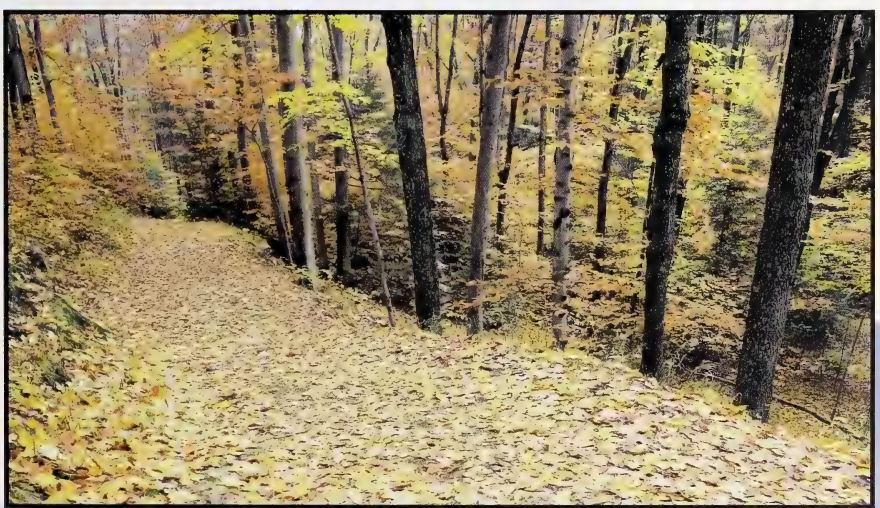
Lesson 1: Plant and Animal Wastes

There are no garbage cans in nature. Plants and animals do not need them. Can you imagine your world without garbage cans? All the trash in the **environment** would make it hard to move around. Today, you will see how plants and animals get rid of their waste.

environment: all of the surroundings and conditions that affect the growth and development of living things

Do you remember how plants give off oxygen, and how animals use it? Plants also use many of the wastes that animals make. Do you remember from Module 4 that plants use carbon dioxide? Carbon dioxide is a gas that animals exhale as a waste gas. Nature is quite good at finding something to use another's waste.

In the fall, leaves drop from trees. Wild grass that has grown tall over the summer turns brown. The growing season is over. Dead plant material is everywhere. When winter comes, a blanket of snow covers the leaves and the dead plants. When the snow melts, much of the dead plant material is gone. Where did it go?



The dead plant material broke down and became part of the soil. This is the fate of leaves, grasses, and other plants in the forest. They break down or **decay**.

decay: to rot and break down

organic matter: material that occurs naturally, such as wood, straw, hair, skin, fur, and bone

Organic matter is matter that occurs in nature. Organic matter decays. That means that it breaks down into simpler things. Nature reuses these simpler things over and over again. Matter that humans make, like plastic bags, glass, and tin cans, is not organic.

decomposer: an organism that feeds on the waste and dead tissues of other organisms

When you see decay, you know that a **decomposer** has been at work. Have you ever seen mouldy food? This is another sign that decomposers are at work. The food begins to rot and change. It breaks into smaller pieces. Bacteria, earthworms, fungi, snails, and many insects are decomposers. They break down organic matter. This broken-down organic matter enriches the soil.

Nature is a great recycler. When leaves fall to the ground, they decay and become food for plants and animals.

The same thing happens when animals die; they become food for other living things.

Humans and animals need to get rid of their body wastes. Body wastes would poison people if they did not get rid of them. Humans use a bathroom. House cats use kitty litter. Wild animals do not use a toilet or kitty litter. In nature, animal waste decays. It contains building blocks or simple nutrients that nourish the soil. Decomposers return these nutrients to the soil. People often refer to animal waste as **manure**. Gardeners mix well-rotted (decomposed) manure into their soil. It improves the soil and helps plants grow faster, bigger, and healthier.

manure: animal waste

Run-off

Run-off is the water that soil doesn't retain or soak up when rain falls on it. It is excess water. Run-off can wash things from the land into creeks, rivers, and lakes. This can pollute the water into which it flows.

run-off: excess water that drains into creeks, lakes, and rivers

What kinds of things can find their way into run-off?

If many animals are kept together, animal waste can build up quickly. It is hard for the decomposers to keep up. This lets animal waste become part of the run-off. Cities and towns produce pollutants as well. Fertilizers and pesticides used on gardens, lawns, and farms may be carried by run-off. Oil and gas that spills from cars and other vehicles can also **pollute** the water.

pollute: put damaging waste into the land, air, or water

Activity 1: Decomposing Dinner

The food you eat is organic matter. It comes from nature. Will food decay faster in the air or under a layer of soil? Try this activity to find out.

What you need

- water
- a spoon
- 2 plant pots
- 2 slices of tomato
- 2 pieces of lettuce
- 2 slices of carrot (about 1 cm thick)
- garden soil (not potting soil)
- a tray (pie plate or baking pan)

Note: Save the pots and soil for later activities.

What to do

1. Fill each pot with soil. Place a piece of carrot, tomato, and lettuce on the soil in each pot.

2. In one pot, cover the food pieces with a thin layer of soil. Do not cover the food in the other pot. Put the pots on the tray.

3. Water both pots so that the soil is moist, but not soaking. Place the pots on a sunny window ledge (or on a table in front of a sunny window).

4. Add a bit of water each day for a week. At the end of the week, use the spoon to scrape the soil off the food pieces in the first pot. Do this very carefully, until you can see the pieces clearly. Compare what you see in both pots.

5. Which food pieces decayed faster?

_____

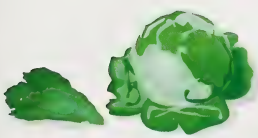
_____

6. Does organic matter decay faster if you cover it with soil? Why or why not?

_____

_____

_____



7. How do you think decomposing matter helps the soil in the pot?

_____

_____

Check your answers for this activity in the Suggested Answers at the end of this lesson.

When it comes to recycling, nature is a great recycler. Decomposers work to break down plant and animal waste and return nutrients to the soil. These nutrients provide food for new plants. Nature's recycling program works all the time, and it doesn't pollute the environment.

Turn to Assignment Booklet 5A and complete question 1 of the Section 1 Assignment.

Suggested Answers

Activity 1: Decomposing Dinner

5. Which food pieces decayed faster?

Thinner (lettuce) or smaller (tomato) pieces of material decomposed faster.

6. Does organic matter decay faster if you cover it with soil? Why or why not?

When you cover organic matter with soil, it decomposes faster than it does in the air. Decomposers, such as bacteria and fungi, live in the soil. Covered matter is surrounded on all sides by decomposers. This makes it decompose faster.

7. How do you think decomposing matter helps the soil in the pot?

Decomposing matter puts useful nutrients into the soil in the pot. These nutrients make the soil better for growing plants.

Key Words

decay: to rot and break down

decomposer: an organism that feeds on the waste and dead tissues of other organisms

environment: all of the surroundings and conditions that affect the growth and development of living things

manure: animal waste

organic matter: material that occurs naturally, such as wood, straw, hair, skin, fur, and bone

pollute: put damaging waste into the land, air, or water

run-off: excess water that drains into creeks, lakes, and rivers

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Lesson 2: Human-Made Waste

People create wastes that pollute the air, the water, and the land. Many of the wastes are products that people have finished using. Today, you will explore this problem.

Humans make many things to improve their lives. Glass, bricks, metal, and plastic are some human-made items. They last a long time and do not break down or decay easily. This is unlike the food pieces you tested in Lesson 1. They began breaking down in just a few days. Our foods are **biodegradable**, but many human-made products are not.

biodegradable: capable of being broken down or decomposed

What do people do when things are no longer useful to them? They put them in the garbage. As a rule, garbage goes to a **landfill** or garbage dump. At landfills, garbage gets covered by soil. It may be out of sight, but it is still hiding just below the surface. When a landfill cannot get any bigger, a new site is chosen. More and more areas are polluted by garbage.

landfill: a place where garbage is buried

As cities grow, more and more space is needed for garbage. In some places, the garbage is transported hundreds of kilometres.

Waste can pollute more than just the land. Waste can also pollute the water and the air.

Have you ever seen gas and oil on the ground in parking lots or gas stations? Gas and oil can create water pollution. (Pollution is land, air, or water that contains damaging waste.) Oil, gas, and other chemicals may run off the land and into ditches or a sewer system. Then they wash into rivers or lakes when it rains. Once they are in the water, they stay there. It is very hard to remove pollutants from water.

sewage: waste that passes through sewers or into a septic system

Livestock run-off and human **sewage** can add a lot of waste to water. Some places do not treat sewage very much. They just let it go into lakes, rivers, or the ocean. These wastes can contain harmful germs. They pollute the water and make it unsafe to drink.

Have you seen smoke coming out of a chimney, a car, or a factory? You were seeing the air being polluted. Smoke is a danger to people's health. Firefighters use a tank of air much like a scuba tank. Then they don't need to breathe smoky air. Smoke may seem to disappear into the air, but it's still there. In time, it will come down again, as it hitches a ride with rain or snow.

Car exhaust contains gases and particles. Some are dangerous for people to breathe. In some cities, the air is badly polluted. It gets so bad that health warnings are given. People with breathing problems are told to stay indoors at home. In Mexico City, people even visit oxygen booths to breathe clean air.

Have you thought about how pollutants get out of the air? Some combine with water to make a weak acid. Rainwater is normally slightly acidic. **Acid rain** is much more acidic. Plants and animals are not used to this acidity. Lakes and forests in eastern Canada have been harmed by acid rain. In some places, the trees have died. No animals can live in the water. These lakes are now dead.

acid rain: rain (or snow) that has become a weak acid by mixing with air pollution

Have you ever sucked on a lemon? Did you find it quite sour? This is a sign that it is an acid. Acid rain is not as strong an acid as lemon juice. However, it still has a horrible effect on lakes.

For a long time, scientists could not understand why the lakes were dying. These lakes were often far away from **sources** of pollution. Scientists have learned that air pollution drifts on the wind, and it often ends up far from its source.

source: the place from which anything comes

Find out more about water, air, and land pollution, as well as recycling and other topics you study in this section.

Go to the YES! Youth for Environmental Sanity website.

http://www.yesworld.org/resources.html

Activity 2: Air Fare

Is there pollution
in the air you breathe?
Is there air pollution in your
house, your garage, or your yard?
You may be stunned at what you find in this activity!

What you need

- 4 similar jars
- 4 coffee filters
- a funnel
- a magnifying glass (optional)
- water
- masking tape
- a felt marker

What to do

Ask your home instructor to help you find appropriate places to put the jars.

1. Use masking tape and the marker to label the jars A, B, C, and D.

2. Pour water to a depth of about 2 cm into each jar. Which area of your house do you think is the cleanest? Place one jar in this room. If possible, put the other jars in three different places outside the house. Try to put one jar in an area that may have some air pollution, such as the garage or a workshop. Place the jars in areas where they will not be disturbed. Use the following chart to record where you put each jar.

Question	Jar A	Jar B	Jar C	Jar D
Where did you put the jar?				
What does the filter paper look like?				

3. Leave the jars for two days.

4. Carefully bring Jar A inside the house and place it near a sink. Place a coffee filter in the funnel. Pour the water from Jar A through the filter into the sink. Let all of the water drip through. Look closely at the filter. In the chart, record what you see on the filter paper. (If you have a magnifying glass, examine the filter more closely.)

5. Repeat Step 4 for jars B, C, and D. Use a new filter for each jar.

6. Where did you find the most pollution?

_____

7. You chose the areas to place the jars with a result in mind. Were the areas as clean or dirty as you thought? Explain your answer.

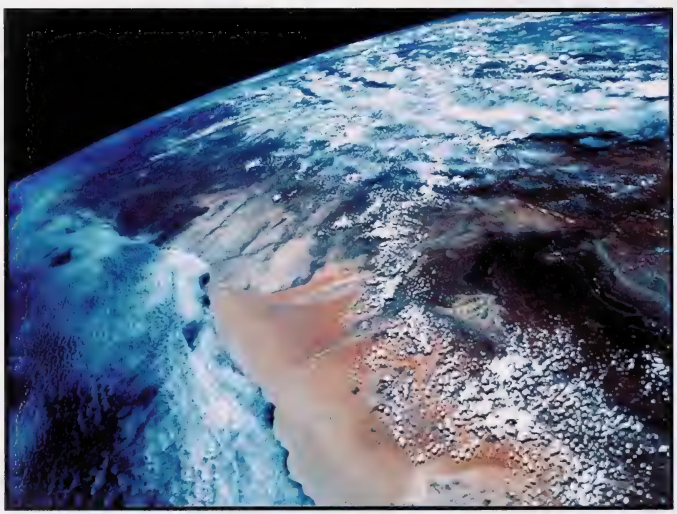
_____

_____

_____

Check your answers for this activity in the Suggested Answers at the end of this lesson.

Think about the things you use once and then throw away. If you can't see these things, are they gone from Earth? Many things you throw away add to the garbage that pollutes Earth. It's not just what you throw away. There are wastes from making your product. These wastes can also pollute our air, land, and water. Nature's decomposers can't break down all of these wastes. The result is a more and more polluted world.



Keep reading to discover more about waste. See what you can do to help clean up your world.

Turn to Assignment Booklet 5A and complete question 2 of the Section 1 Assignment.

Suggested Answers

Activity 2: Air Fare

2. Pour water to a depth of about 2 cm into each jar. Place one jar in a clean place inside your house. If possible, put the other jars in three different places outside the house. Try to put one jar in an area that may have some air pollution, such as the garage or a workshop. Place the jars in areas where they will not be disturbed. Use the following chart to record where you put each jar.

Here is a sample answer. Your answers will likely be different.

Question	Jar A	Jar B	Jar C	Jar D
Where did you put the jar?	kitchen	bedroom	garage	backyard
What does the filter paper look like?	clean	clean	some light brown or grey colour	some light brown or grey colour

6. Where did you find the most pollution?

High-pollution spots might be the garage, near roads, or places where machines like lawn mowers, cars, chain saws, and motorbikes are used. You likely found more air pollution outside than inside.

7. You chose the areas to place the jars with a result in mind. Were the areas as clean or dirty as you thought? Explain your answer.

Dirty air inside your home might have surprised you. Smoking, cooking, pets, and wood fires (from a fireplace or wood stove) can add to indoor air pollution. Even open windows on a dry summer day can let in a lot of dust.

Key Words

acid rain: rain (or snow) that has become a weak acid by mixing with air pollution

biodegradable: capable of being broken down or decomposed

landfill: a place where garbage is buried

sewage: waste that passes through sewers or into a septic system

source: the place from which anything comes

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Lesson 3: Water Waste

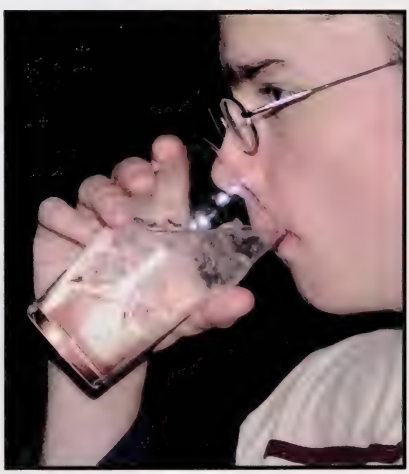
Did you know that $\frac{7}{10}$ of your body is water? Think about taking a long drink of cool water on a hot day. Your body takes that water and refills your body's cells. It helps keep you alive. Fresh water is precious. Today, you will discover ways to save fresh water.

There is plenty of water on Earth. Water covers about $\frac{3}{4}$ of the planet's surface. Most of the water is in the oceans. It is salt water. Only $\frac{3}{100}$ of the world's water is fresh water. Ice at the North Pole and South Pole holds most of this water. It is frozen and piled high in glaciers. The ice in icebergs is also fresh water. The small bit of fresh water that is not frozen is all that people can use.

As a Canadian you are very lucky. Canada has more fresh water than most countries. Can you see yourself walking half an hour for a drink of water? This is a way of life in many parts of Africa. Since water is scarce, people have to spend a lot of time and effort to get it. Even then, the water may not be safe to drink. Thousands of people die each year from drinking impure water (dirty or disease-carrying water).

Much water in Canada is also not clean. Homes and cities add waste and sewage to the water supply. Chemical and oil spills also pollute the water. Run-off from landfills, farms, and factories add pollutants as well.

As you've just read, pollution gets into the water in many ways. You need to be careful about what you put down a drain. For example, paints and cleaners should be taken away to be treated. They don't belong in the **sewer**. Do you think cleaning polluted water is an easy task? It isn't. Keeping the water clean in the first place is much easier.

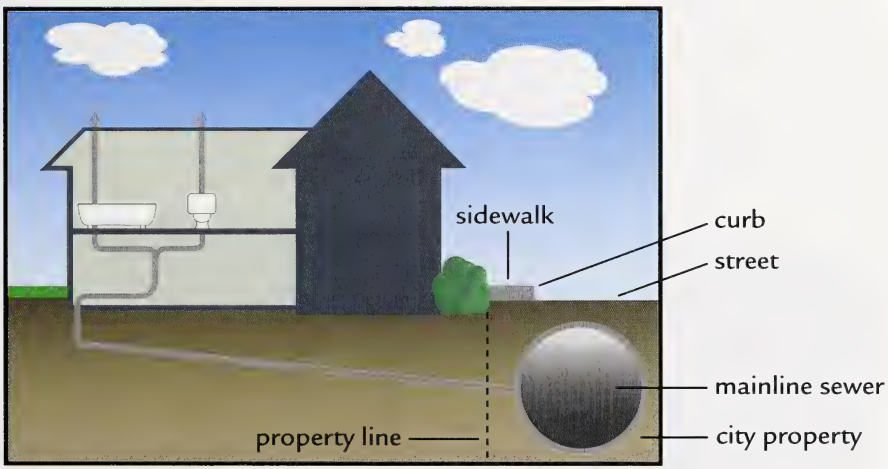


sewer:
underground pipes that carry waste

grey water: water that drains from sinks and tubs

When you wash yourself, your clothes, or your dishes, the water gets dirty. It is no longer clean water. The more water you use, the more dirty water you make. **Grey water** is any water going down the drain. This water then enters a septic system or the local sewer system.

What is a septic system? A septic system is a mini sewer system. It is found on farms or acreages. It collects the grey water and sewage from one household.
What is a sewer system? A sewer system is a collection of underground pipes and tanks that collects grey water and sewage from homes and other buildings. It may also include a plant that treats the sewage.



Human waste also goes into the sewer system. Every time you flush the toilet, you add waste to the sewer system. Treating raw sewage is one way to protect the environment. There are many ways to treat sewage. Sometimes, liquid and solid wastes are separated. This way you can choose the best way to treat each part. Some towns have sewage lagoons, which are large ponds. These lagoons let nature work at cleaning the water. Many towns release treated sewage into rivers, lakes, or the ocean. Good treatment and efforts to reduce sewage means less water pollution.

Paris, France, is sometimes called the City of Romance. You may have seen pictures of the Eiffel Tower or paintings in the Louvre. These places are in Paris. Paris also has a more practical side. The people of Paris are very proud of their sewer system. It is very long and complex. In fact, this system has over 2000 km of tunnels! Tourists can buy tickets to visit the Paris Sewers Museum. They get to visit some of the tunnels built more than 150 years ago.

Here are two websites you can visit to find out more about the Paris Sewers Museum.

- **http://www.mtholyoke.edu/courses/rschwart/hist255-s01/mapping-paris/Paris_Sewers_Page.html**

- **http://europeforvisitors.com/paris/articles/paris-sewers-museum.htm**

The more water put into a sewer system, the larger the treatment plant has to be. It makes good sense to decrease the amount of water that enters the system. One way to do this is to reduce the amount of grey water.

In your home, grey water comes from any drain in the house, other than the toilet. Think about how you use the washer, bathtub, shower, and sinks. Can you think of ways to reduce the amount of grey water coming from your house?

In North America, people use up to 260 L of water per day. That is ten times more than may be needed. A person can stay clean and healthy using just 25 L to 45 L of water per day. Most people can find many ways to reduce their water use.

Flushing the toilet makes up almost half of people's water use. Some people put a brick in their toilet tank. The brick takes up space. There is less room for water, so each flush uses less water. You can also buy toilets made to use less water. Bathing and washing use a lot of water too. To reduce the amount of water you use when showering, try a water-saving showerhead. Several small loads of laundry use much more water than one big load.

In the summer, using garden hoses and sprinklers wastes a lot of water. Carrying watering cans is hard work, but watering by hand uses much less water. Some people save their dishwater for the garden. Others use a rainbarrel to collect water. This reduces water use even more. Washing a car using a bucket saves water too.

These are some simple ways to reduce your water use. When you reduce water use, you help reduce water pollution. You also use less of a scarce resource.

Imagine

The year 2000 was a bad year for people in Walkerton, Ontario. Run-off entered their drinking-water system. The water treatment plant didn't kill all of the germs in the water. These germs made more than 2000 people very sick. Seven people died in this E. coli tragedy. Having safe, clean drinking water is important for everyone.

E. coli: a bacteria found in humans and cattle

Activity 3: Bath or Shower?

In this activity you will find out which uses more water—a bath or a shower.

What you need

- a bathtub with a shower
- a ruler

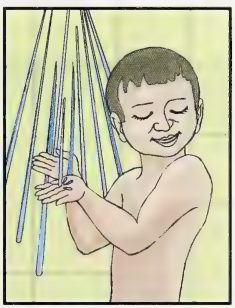
What to do

This activity will take place over two days. On the first day, you will take a bath. On the second day, you will take a shower. Another person could also take the bath or shower. Just ask him or her to save the water so that you can measure it.

1. You will complete this step in the bath! Have a bath just as you normally would. Before you drain away the water, measure the height of the water with the ruler. Record what the water looks like. Also record if you used bubble bath, bath oils, soap, shampoo, or other bath products.

Height of bath water in tub	
Bath water description	

2. You will complete this step by using the shower in the bath. Before you begin your shower, put the plug in the drain. Now have a shower as you normally would. When you have finished your shower, use the ruler to measure the height of the water. Record what the water looks like. Also record if you used soap, shampoo, or other bath products.



Height of shower water in tub	
Shower water description	

Check your answers for this activity in the Suggested Answers at the end of this lesson.

Taking a shower often uses less water than a bath. Think of all the water your family uses every day. There will be a lot of grey water that comes from all the drains in your house. What can you do to help reduce this amount?

Turn to Assignment Booklet 5A and complete question 3 of the Section 1 Assignment.

Suggested Answers

Activity 3: Bath or Shower?

1. You will complete this step in the bath! Have a bath just as you normally would. Before you drain away the water, measure the height of the water with the ruler. Record what the water looks like. Also record if you used bubble bath, bath oils, soap, shampoo, or other bath products.

Here is a sample answer. Your answers will likely be different. It depends on how much water you like in your bath.

Height of bath water in tub	20 cm
Bath water description	• bubble bath, soap, shampoo • water soapy and a bit cloudy

2. You will complete this step by using the shower in the bath. Before you begin your shower, put the plug in the drain. Now have a shower as you normally would. When you have finished your shower, use the ruler to measure the height of the water. Record what the water looks like. Also record if you used soap, shampoo, or other bath products.

Here is a sample answer. Your answer will likely be different. It depends on how long you shower and whether your showerhead is low-flow (water-saving). For most people, showers use less water.

Height of shower water in tub	5 cm
Shower water description	• shampoo, soap, body wash • a bit of oil film, soap in water • looks a bit cloudy

Key Words

E. coli: a bacteria found in humans and cattle

grey water: water that drains from sinks and tubs

sewer: underground pipes that carry wastes

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Lesson 4: Pollution on Land

What would happen if you did not throw away anything? Your house and yard would soon look like a landfill. Garbage would pile up deeper and deeper. The house would start to smell. The garbage would attract flies and other animals. You might get sick. Human garbage can create a health problem. Today, you will look at the problem of garbage and the way it can pollute the land.

There was a time when people did not make as much garbage. Things were made to last. Most things were used and reused. Things were saved and not wasted. Today, many things are disposable. You use them once or for a short time and then throw them away. Can you see why North America is often called a "throwaway society"?

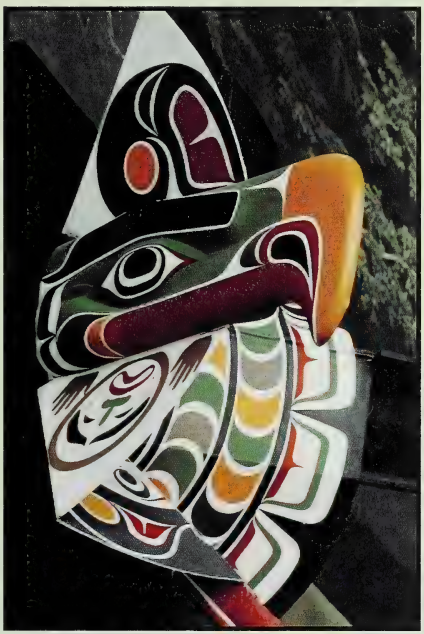
disposable: designed to be used once and then thrown away

A CLOSER LOOK First Nation Midden Sites

The old villages of Canada's West Coast First Nations have almost gone. First Nations' peoples there used building materials found in nature to build the village. Over time, nature's decomposers have done their job. Now, only the soil shows that people once lived on the sites.

middens: garbage disposal sites

The garbage disposal sites of these villages are called **middens**. Middens can be many feet deep. They are very different from modern landfill sites. In these middens, the soil is black with white flecks. The white flecks are fragments of shells. Clams were an important source of food for the villagers. The shells were left on the ground with other waste. But the shells did not decompose. They were the only real garbage.



Modern landfills are not like middens. Modern landfills keep garbage in one place, but the garbage does not go away. It is only contained. Some landfills lack the water and air that garbage needs to decompose. Scientists have dug up newspapers from thirty-year-old landfills. They could still read the papers!

Each Canadian throws away about 2.5 kg of waste per day. Where will we put our waste when we run out of space for landfills? One way to help solve this problem is to make less garbage.

Food, yard waste, paper products, and the packages for these items make up most of a household's waste. Some of this garbage will break down naturally. Things like glass, plastic, and metal do not break down. They will remain in the landfill for a very long time.

Landfills smell bad because of the rotting waste. Rotting waste gives off **methane** gas. Don't blame methane for the smell. It is both colourless and odourless. When mixed with air it can be highly explosive. Methane is a **greenhouse gas** as well.

methane: a greenhouse gas

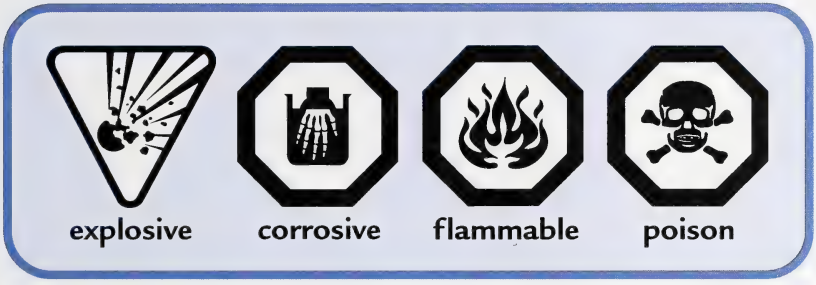
greenhouse gas: a gas that traps heat and causes global warming

Rotting garbage also produces a liquid. The liquid can find its way into the ground beneath the landfill. It can enter our fresh-water supply. In some places, this liquid travels a long way from the landfill. Imagine if the water in your tap came from under a landfill. What a horrible thought!

toxic: poisonous

Many industries produce chemicals and wastes that are **toxic**. Toxic items are harmful to living things. Toxic waste needs special methods to treat it. It is too dangerous to put in a landfill. Industries must treat their wastes correctly. If they do not, they face heavy fines. They also have to clean up any areas they have polluted.

Most homes also have toxic products in them. Things such as batteries, household cleaners, paint products, and products in spray cans (oven cleaners, hair sprays, adhesives) could be toxic. These products may have hazard symbols printed on their labels.



Most labels give advice on the correct disposal of the product. Before throwing away items into the garbage, check the label to be sure you are treating the waste correctly. Most places have a way to deal with dangerous household products. It is important to discover what it is. Some places have a truck that comes around once or twice a year to collect hazardous materials. Or, there may be a special depot where chemical containers are collected. For example, old medicines, pills, and vitamins should be taken to a pharmacy. They should not be put in the garbage or down a drain. However, these products often end up in landfills. They don't get treated as toxic waste. This makes the landfills even more polluted.

The Swan Hills Treatment Centre

Alberta has a plant that treats hazardous wastes. It does a world-class job of treating them. The plant is near the town of Swan Hills and was built in the early 1980s. The Alberta Government now owns the treatment centre. A private company runs it for the government.

The plant treats dangerous waste in several ways. Some chemicals can be made safe only by burning them at very high temperatures. The plant has furnaces that burn chemicals at over 1200°C. This completely destroys the waste.

Simpler ways can make other chemicals safe. Mixing some wastes with other chemicals leaves a new, but safer, substance. Or, perhaps the result is something that can be stored safely.

Still other wastes need only to be stored safely. The plant can treat them so they pose no danger to the environment. They are then stored on the site or deep in the earth.

The Swan Hills Treatment Centre shows that people are concerned about dangerous waste. They are working to make our environment safer.

Activity 4: Biodegradable Bits

Can you tell which pieces of garbage are biodegradable? Try this activity to test your garbage know-how!

What you need

- plastic wrap
- garden soil (not potting soil)
- a clear plastic cup or other clear, wide-mouthed container
- waste scraps: small pieces of paper, cardboard, aluminum foil, plastic, and a few vegetable or fruit scraps

What to do

1. Fill the glass with soil, adding the waste scraps at different depths. Place the waste scraps close to the edge of the glass. You'll be able to see them easily there. You may need to use more than one container.
2. Cover all of the scraps with soil.

3. Write the types of waste across the top of the chart.

Type of Waste					
Day 2					
Day 4					
Day 6					

4. Push the soil down firmly. Add water until the soil is moist. Cover the glass with plastic wrap.

5. Predict which items in your glass will start to biodegrade, or decompose. List them here.

_____

6. Check the glass every second day. Use the chart to record any changes in the scraps.

Check your answers for this activity in the Suggested Answers at the end of this lesson.

How can you reduce pollution? Can people learn from the way waste is recycled in nature? The materials that make up our garbage makes this hard to do. Many materials do not decay easily. Keep reading to find out what you can do!

Turn to Assignment Booklet 5A and complete question 4 of the Section 1 Assignment.

Suggested Answers

Activity 4: Biodegradable Bits

5. Predict which items in your glass will start to biodegrade, or decompose. List them here.

Organic matter will likely decay the most quickly. This would be things like food scraps, as well as small pieces of paper.

6. Check the glass every second day. Use the chart to record any changes in the scraps.

Here is a sample answer. Your answers will likely be different. The types of wastes you are testing may be different.

Generally, you should find that small food scraps will probably show signs of decay first. Some items, such as meat, will begin to rot and smell. Plastics, glass, and aluminum foil will not change.

Type of Waste	paper	foil	plastic	fruit scrap	vegetable
Day 2	no change	no change	no change	some mould	no change
Day 4	no change	no change	no change	more mould	some mould
Day 6	slightly softer	no change	no change	lots of mould	more mould

Key Words

disposable: designed to be used once and then thrown away

greenhouse gas: a gas that traps heat and causes global warming

methane: a greenhouse gas

middens: garbage disposal sites

toxic: poisonous

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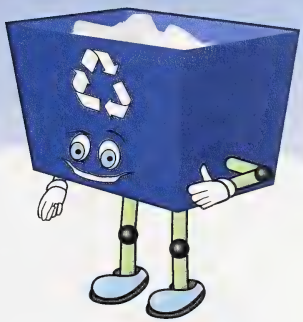
Section 1

Conclusion



In this section, you looked at the types of waste in our world. You know about organic and human-made waste, and the effect they have on our environment. Were you surprised to see the waste and pollution around you? Although Canada is a lot cleaner than some other countries, we can still improve.

In the next section you will discover ways to improve the quality of our environment.

Now turn to Assignment Booklet 5A and complete the Student Feedback questions. Then go to the Checklist for Section 1 in your Assignment Booklet. Make sure you have collected everything on the Checklist to send to your teacher.

Optional Follow-up Activities

Activity 1: Pollution in the News

What you need

- newspapers
- pencil crayons or markers

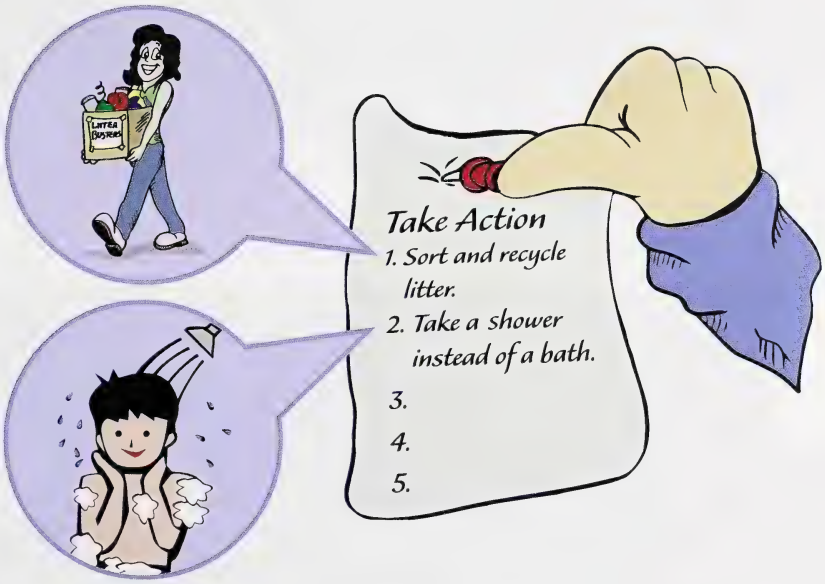
What to do

Look through the newspapers every day for a few days and see how many news stories are about pollution and waste. Cut out the articles and circle the problem in one colour. If the articles suggest solutions to the problem, circle those in a different colour.

You may share the stories with your family or your teacher.

Activity 2: Taking Action

Talk with your family about ways you can cut back on the waste and pollution in your own home. Make a list of at least five things your family can do.



Section 2

Pollution Solutions

Introduction

In Section 1: Natural and Human-Made Waste, you looked at the types of waste found in our communities and how it affects our environment. Now you will find out what you can do to change this. There are many things you can do to limit waste. If each person does a little bit, it will make a big difference!

In this section, you will explore the three Rs—reduce, reuse, and recycle. You will make a plan to reduce waste in your home.

Lesson 5: Reducing

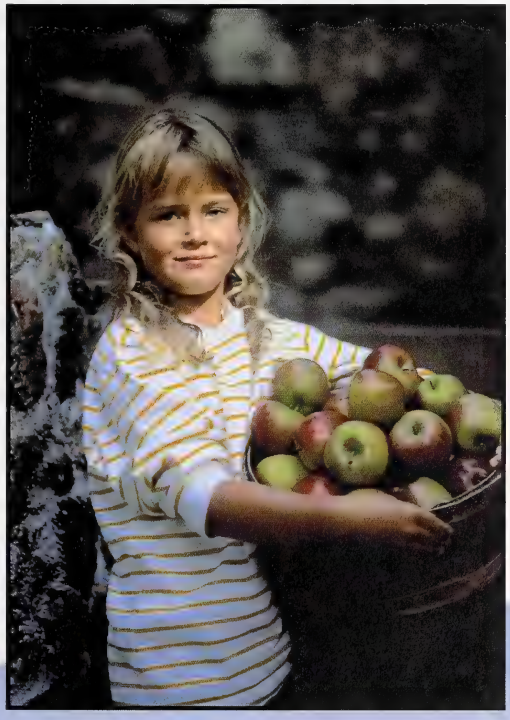
Do you know the three Rs: reduce, reuse, and recycle? Today, you will look at reducing.

There is a way to end the pollution problem: stop polluting! In today's world, this is not easy. In fact, it may not be possible. There are ways to make things better. People can change their habits to help the environment. What can you change to help?

Reducing

reduce: use less

You can **reduce**—by buying only what you need. You can make do with less. Use less water, less plastic, less detergent, and less paper. You need to be careful and think before buying things and before throwing things away.



Reducing your use of natural resources will help the environment. Does your home have a thermostat that can be programmed? The room temperature can also be lowered. These changes will save natural gas, other fuels, or electricity.

There are many other ways to reduce what you use. Cars and other vehicles run on gas and oil, which are valuable natural resources. Car exhaust adds to air pollution. Bicycles and walking use human energy. Ride your bike or walk, if possible, and you can reduce the amount of gas and oil your family uses. You will also help reduce air pollution. If each family member participated, there would be even less pollution.

You and your family may also be able to reduce the amount of oil and gas used by

- using public transportation (taking a bus)
- carpooling (riding with people going to the same place)
- buying more fuel-efficient vehicles (smaller cars)
- using hybrid cars (cars that use electricity and gas)

These ideas may not work for you and your family. Can you think of ways to reduce the amount of oil and gas your family uses?

Water is an important natural resource. In Lesson 3, you looked at water use. You saw some ways to reduce your family's use of water. You also saw that using too much water can add to pollution. Put some of your water-saving ideas into practice. Ask your family to try your ideas too.

Power plants create electricity by using many resources. They can also create pollution. There are easy ways to use less electricity. Turn on lights and the stereo, television, or computer only when you need them. Don't leave lights and appliances on all the time.

There are energy-saving light bulbs. Try to use one when a bulb needs replacing. You might also be able to use a bulb that has fewer watts (it won't be as bright). You help yourself when you reduce the amount of electricity you use. Your family will save money. The environment will thank you too!

Some people use solar panels to supply their electricity. When light shines on these panels, they make electricity. Solar energy does not pollute the way other power plants do. Using them reduces the need to buy power from larger power stations.

Many things you buy come in plastic containers. Using fewer of these products means less waste plastic. Here is a simple example. Do you help wash dishes? Instead of using a big squirt of dish soap, you can use a smaller squirt. The dishes will still be clean. Instead of using 1 bottle of dish soap a month, your family might use one bottle every 6 weeks. This adds up to 8 bottles a year, instead of 12. That is 4 fewer plastic bottles for the landfill.

packaging: plastic, foil, and paper wrapping around items for sale

You can also reduce the amount of **packaging** you buy. Packages keep things clean and safe. They prevent things from being broken or spoiled. Packaging includes boxes, bags, cardboard, and plastic and foil wrapping. You'll find it on nearly everything you buy. You'll often choose things because you know their packages. Packages may make your life easier. But, remember, the cost of the item includes the cost of its packaging.

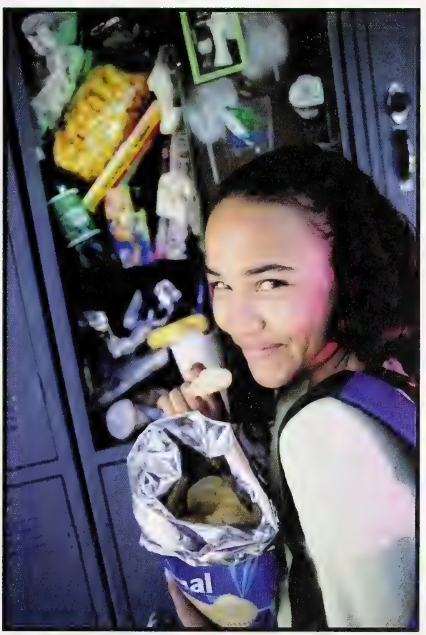
Is all this packaging really necessary? Long ago, shopping for food was not the same as it is now. A shopkeeper took your shopping list and gathered what you wanted. Things didn't need to be ready for you to pick out yourself. People used baskets and cloth bags to carry their groceries. This was a slower way of shopping, but there was much less packaging to throw away.

Today packaging makes shopping faster. Packaging tempts the customer saying, "Buy me!" and it can add to your cost. Packaging may add $\frac{1}{10}$ or more to the cost of the product.

Packaging makes up much of the garbage in landfills. You can reduce packaging by going to the bulk food section of your grocery store. You can also use your own containers and your own shopping bags. You can also refuse to buy things that have too much packaging. Companies notice when shoppers are not buying their products. They need to sell their products and will change things if it makes them money. You have more power over packaging than you might think.

Activity 5: Power of a Package

Think about going to a store to buy something. How will you choose your item? Do you look at the packages? Could they be the reason for your choice? How will the packaging affect the environment when you throw it away? Try this activity.

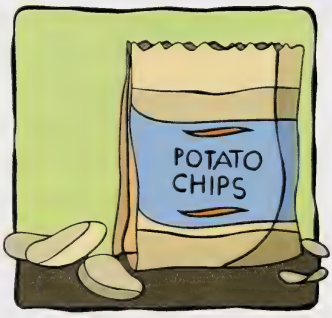


Ask your home instructor for help with this activity.

What You Need

- a pen or pencil
- paper or notepad

What to do



1. With an adult's help, choose a grocery store and go visit it. Choose one item to look at closely. For example, look at the different brands of potato chips. Study the packaging for all of the brands of this product.

   Review questions 2 to 6 before your visit. Take notes so that you will be able to answer these questions.

2. How does the packaging catch your eye and attract you to the product?

   _____

   _____

   _____

   _____

3. What is the packaging made of? Can you recycle these materials?

   _____

   _____

   _____

4. Do you think the packaging is needed? Does it protect the product or make it safer for you? Would it be safe to use less packaging? Explain your answer.

   _____

   _____

   _____

5. Find several brands of the item you are studying. Which brand will produce less garbage? Explain your answer.

_____

_____

_____

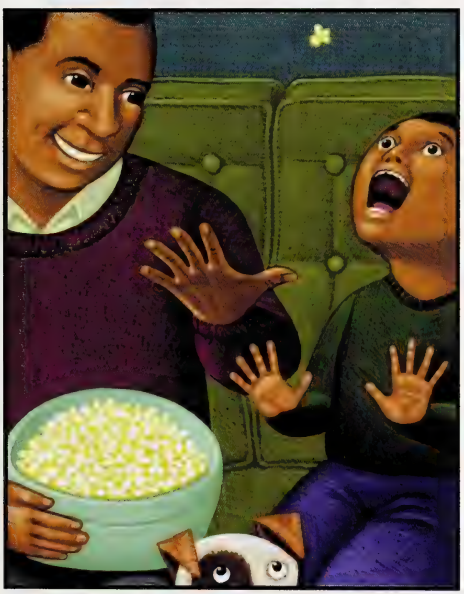
6. If you were designing the package for this product, how would you create less waste?

_____

_____

_____

Check your answers for this activity in the Suggested Answers at the end of this lesson.



Buy popcorn in bulk instead of individual bags.

What are some ways you can help with the pollution problem?

- You can reduce. You can use less water, electricity, gas and oil, paper, plastic, and detergent.
- You can buy products with less or no packaging or biodegradable packaging.

Reducing is only part of what you can do to help the pollution problem. Find out more in Lesson 6.

Turn to Assignment Booklet 5B and complete question 5 of the Section 2 Assignment.

Suggested Answers

Answers will vary, depending on the product you chose to study. General answers are given. Ask your home instructor to review the answers with you.

Activity 5: Power of a Package

2. How does the packaging catch your eye and attract you to the product?

Bright colours and shiny paper are among the eye-catching effects used. Sometimes you'll find small items in a large box or bag. It seems you will get more product than you actually do. You will often see prizes or contests advertised on the packages. Some products use photos of star athletes or other famous people to attract you.

3. What is the packaging made of? Can you recycle these materials?

Packaging often includes several materials. For example, cans may have a paper wrapper. Paper, cardboard, glass, tins, and some plastics can usually be recycled. This will depend on the recycling program in your area. Plastic foam chips, foil, and plastic wraps are usually not recyclable. The foil-type bags from potato chips and other foods also cannot be recycled.

4. Do you think the packaging is needed? Does it protect the product or make it safer for you? Would it be safe to use less packaging? Explain your answer.

Yes, packaging is needed for many food items. Sometimes there is more packaging than is needed. Fruits like oranges or grapefruit do not need extra packaging. However, you often find these fruits packaged in plastic or net bags or cardboard boxes. Food items are packaged for health reasons (for example, meats) and to protect the food (for example, eggs). Fragile non-food products need packaging to protect the items. Other items, such as toys, might not need much protection.

5. Find several brands of the item you are studying. Which brand will produce less garbage? Explain your answer.

Since every answer will be different, here are some ideas to think about. Look for products that use as little packaging as possible. Do they protect the product and provide the information that you need? Also, decide if the packaging can be recycled. Is the packaging biodegradable?

6. If you were designing the package for this product, how would you create less waste?

Your answer will depend on the item you chose. Think about using a smaller package. Do you need a box or bag, or could stickers or tags give needed information? Could recyclable packaging be used? Could biodegradable packaging be used?

Key Words

packaging: plastic, foil, and paper wrapping around items for sale

reduce: use less

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Lesson 6: Reusing

Many things in the world are disposable. They get used once or for a short time and then are thrown away. Making disposable items uses a lot of resources, and the items create a lot of garbage. You can avoid these problems by reusing things. This means using products that are not disposable. Today, you will look at the second R—reusing.

Reusing

A large supermarket gives out thousands of bags each day. Many of these bags get used only once. They rip or become dirty. Then they become garbage. These bags are disposable, but other bags are not. Cloth bags and knapsacks are reusable. The next time your family goes shopping, remind them to bring reusable bags.

Do you think that all bags are garbage? Many times you can reuse them. (You might have to clean them up a little.) Some stores even have boxes to collect reusable plastic bags. If you collect many bags, take them back to the store and put them in the containers there or recycle the bags along with other items.

Next time you get a present, try not to rip the paper. Open your present carefully and save the paper. When you have a present to wrap, use the paper you saved. You have just reused the gift-wrapping paper. Some people even save the foil from candy wrappers. They use it to wrap small gifts or for crafts.

There are many other ways to reuse paper. You can make papier-mâché from scraps of used paper. Using both sides of a piece of paper is an easy way to reuse paper. First collect pieces of paper with one unused side. Then, cut them to the same size. You staple them together in a pad as the last step. (And remember, recycle the paper after it's been used on both sides!)

You can reuse plastic containers from yogurt and margarine and glass jars from pickles and jams. Use these containers to store food, such as raisins, nuts, or leftovers. They can also be used for storing craft materials or small workshop items. Store game pieces, building blocks, puzzles, and toys with small parts in used ice-cream pails.

Worn or torn clothes may be mended, altered, or used as play, dress-up, or paint clothes. They may be reused in crafts or quilts. They can be used as rags. You can use and reuse rags, unlike paper towels, which are disposable.

Activity 6: Making Wood from Paper

People often use crumpled newspaper when starting a fire. You can also use the newspaper as a piece of wood. You roll the newspaper so that it looks like a log. A newspaper log will burn more slowly than most real logs. You will make a paper log in this activity.

What you need

- a stack of old newspapers (Try to avoid coloured pages.)
- tape or cotton string

What to do

1. Stack 10 sheets of newspaper.

2. Starting at one edge, roll the newspaper into a very tight roll.

3. When you have finished rolling the tube, tape it in place. (You can also use cotton string to hold the roll together.)

4. Save the logs for the next time your family has a campfire or uses a fireplace or wood stove.

5. You have read about several ways to reuse paper in this lesson. Describe three other ways that you can reuse paper.

_____

_____

_____

Check your answers for this activity in the Suggested Answers at the end of this lesson.

Take a close look around your home. What items are reused in your home? Are things that could be reused thrown away? Be "environment smart" and always ask yourself, "How can I use this again?"

You can reuse clothes to dress a garden scarecrow. The scarecrow can be stuffed with crumpled plastic bags or plastic bags filled with crumpled newspapers!

Turn to Assignment Booklet 5B and complete question 6 of the Section 2 Assignment.

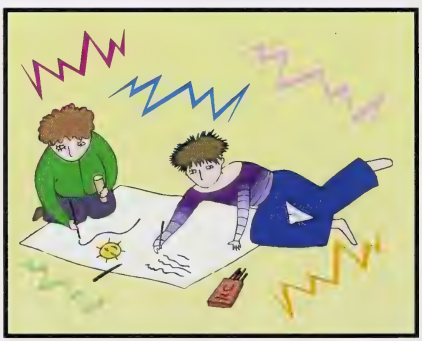
Suggested Answers

Activity 6: Making Wood from Paper

5. You have read about several ways to reuse paper in this lesson. Describe three other ways that you can reuse paper.

Your answer may include ideas like these:

- Rip it up for crafts such as papier-mâché.
- Make a notepad.
- Make a paper airplane, kite, or other toy.
- Make your own recycled paper.
- Wrap a gift.
- Crumple it up and use it to pack a parcel.
- Use the paper as a liner in pet cages.
- Use the blank side of a piece of paper for drawing or writing.



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Lesson 7: Recycling

In the last two lessons, you explored two of the three Rs—reduce and reuse. The third R stands for **recycle**. Today, you will look at ways to recycle and see how recycling can work in your home.

recycle: to process a used item so the materials that were used to make it can be reused

Recycling

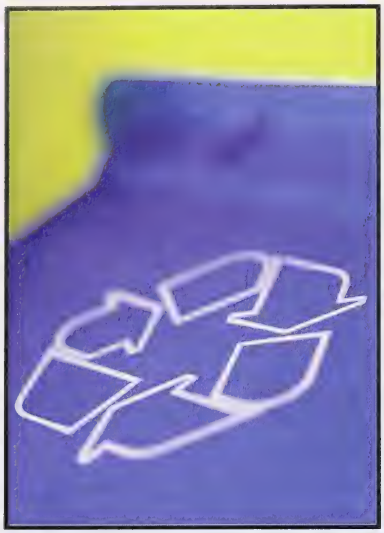
You have less waste when you reduce and reuse, but you cannot reduce and reuse everything. You will still have some garbage.

You can recycle some of the things you would usually throw in the garbage. You don't reuse the products, but the materials in them stay out of the garbage. After **processing**, the materials become new products.

processing: handling in a special way

Here are some examples:

- used paper ⟶ recycled paper
- melted down old glass ⟶ new glass
- old aluminum cans ⟶ new aluminum cans



Do you know the recycling logo? It has three arrows that form a triangle. The triangle has no beginning and no end. It is a symbol of links and the use of materials again and again.

Some communities have a curbside recycling service. Each house uses special boxes or bags to hold items for recycling. These boxes and bags are usually blue in colour. They hold newspapers, glass jars and bottles, tin cans, and aluminum. Some communities also collect cardboard and some plastics. One full blue box means one less bag of garbage. Once a week, the full boxes are put out on the curb. The materials don't go to a landfill. They go to a recycling depot.

In many communities, you can also bring your recyclable items to recycling centres.

If you recycle paper, glass, tin, aluminum, and plastic, there will be much less garbage. Most of the garbage that is left will be

- food scraps
- yard waste
- packaging that is not recyclable

compost (v): to turn organic matter into soil-like material full of nutrients

Food scraps and yard waste aren't really garbage. They can also be recycled. In the next lesson, you will see how to compost.

Even highways can be recycled! Asphalt and concrete can be recycled and used again in new highways. In some places, road builders use recycled glass and tires in their roads.

A variety of uses for used tires is shown at this website:

http://www.trma.com

Plastic

Plastic makes up about $\frac{12}{100}$ of the waste people throw away. Why give special attention to such a small part of our garbage? It remains in the environment for hundreds of years. It really does not go away. While it may break into smaller pieces, it is still there. It interferes with the lives of animals, both on land and in the ocean. Have you seen pictures of animals caught in plastic can holders?

What makes plastic so difficult for nature to get rid of? Most plastic does not biodegrade. Part of the problem is that it is human-made. The usual natural decomposers are unable to break it down.

There are many types of plastics. Most plastic bags are soft, but plastic chairs and many toys are a hard plastic. The many types of plastic also make recycling harder.

Some plastics, such as milk jugs and yogurt containers, can be recycled. They usually have the recycling logo on them. In the middle of the logo is a number that refers to the type of plastic. For example, number 4 plastics would go to a recycling depot that collects number 4 plastics. (See if you can find a number inside the recycling logo of some plastic items around your home.)

Glass and tin can be recycled many times. Plastic is usually recycled one time. It is melted and made into other things, such as outdoor furniture and fence posts.

Visit the Environment Canada website. See what you can find out about pollution and the environment.

http://www.ec.gc.ca

Discover more about recycling at Environment Canada's publications website. Scroll down to "Recycling" and explore the different items.

http://www.atl.ec.gc.ca/publications.html

For some recycling fun, visit Recycle City sponsored by the United States Environmental Protection Agency.

http://www.epa.gov/recyclecity

Everything that can be recycled came from raw materials. When you recycle, you save raw materials.

The following chart shows the raw materials used in some recyclable items.

Recyclable Items	Raw Materials
glass	sandstone, limestone, soda, and ash
paper	trees, chemicals (Some papers are made from other plants, such as rice.)
pop cans	aluminum ore
tin cans	iron and tin ores
plastics	petroleum products (oil)

A flow chart can show how products come from raw materials and then how they are disposed of after use. Look at the example.

Raw Material		Product		Use		Disposal
aluminum ore	→	aluminum	→	pop can	→	recycle

The arrows show that a pop can began as aluminum ore. The ore was the raw material used to make the aluminum. The aluminum was used to make the pop can. After use, the can was recycled to be used again.

Activity 7: Making a Recycling Centre

Do you have a recycling program in your area? If not, you can make a recycling centre. Perhaps your family already recycles items. You could set up a second station in your home.

What you need

- a felt pen
- poster paper (optional)
- several cardboard boxes or other large containers

Ask your home instructor to help you with this activity.

What to do

1. Find out which items can be recycled in your area. You may need an adult's help to find this information. List these items in the chart on the following page.

2. Find out how to get the recyclable items ready for recycling. For example, you may have to wash tin cans and remove their labels. Some areas may also ask you to flatten the cans.

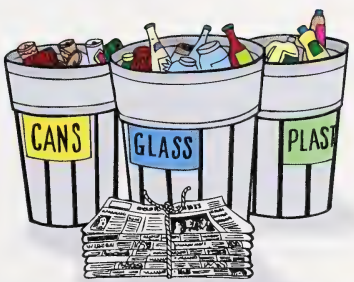
   Add the information you find to the following chart.

Item	How the Item Must Be Prepared for Recycling

3. Set up your boxes to make a home recycling centre. On each box, list the items to go into that box. Also tell how you must prepare the item. You can make a poster to let your family know about your recycling centre.

Check your answers for this activity in the Suggested Answers at the end of this lesson.

How successful is your recycling centre? How much landfill space do you and your family save in a week?



Turn to Assignment Booklet 5B and complete question 7 of the Section 2 Assignment.

Suggested Answers

Activity 7: Making a Recycling Centre

2. Find out how to get the recyclable items ready for recycling. For example, you may have to wash tin cans and remove their labels. Some areas may also ask you to flatten the cans.

Your answers may vary. They will depend on what can be recycled in your area. You may even have to prepare items differently.

Item	How the Item Must Be Prepared for Recycling
newspapers	dry and tied in bundles
paper	dry and separated into coloured paper and white paper with no tape or staples
magazines	dry with sticky address labels removed
cardboard	dry, flattened, and tied into bundles
glass	rinsed clean with lids removed
tin cans	rinsed clean with labels removed; both ends removed and cans flattened
plastics	sorted into plastic types; rinsed clean with lids removed
milk/juice cartons	rinsed clean and flattened

Note: In many places, you do not have to sort your recyclables. You put all the items together in your "blue" box or bag. This makes recycling easier for you. Because it is easier, more people recycle their "garbage."

Key Words

compost (v.): to turn organic matter into soil-like material full of nutrients

processing: handling in a special way

recycle: to process a used item so the materials that were used to make it can be reused

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Lesson 8: Composting

In Lesson 7, you looked at recycling bottles, cans, and paper. These waste items can be taken to a recycling depot. They are sorted and treated there. Most of the material is sent away to be recycled.

Food scraps and yard waste can also be recycled. These items are not sent away. They are composted. Today, you will explore composting.

Composting

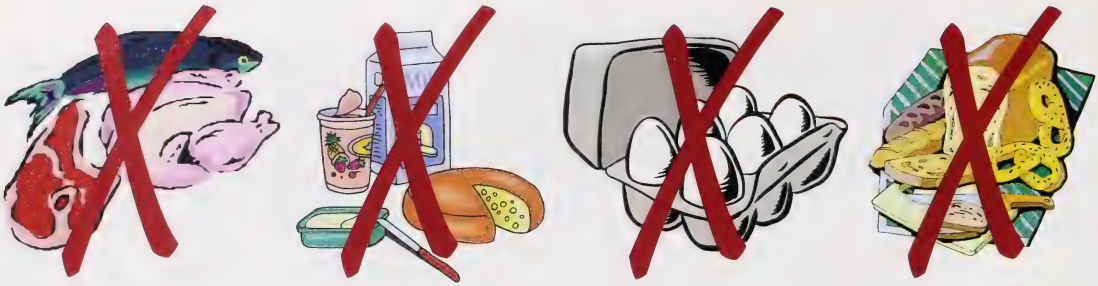
You can compost in your backyard. Yard waste and food waste make up about $\frac{1}{4}$ of garbage. You can compost food scraps and yard waste, such as leaves and grass clippings. Decomposers such as worms, insects, and bacteria do the hard work in making compost.

Composting turns food and yard waste into something that gardeners like. Compost contains important nutrients that help plants grow. Adding compost makes soil rich. Plants become healthier when their soil becomes richer. Fruit, flowers, and vegetables become larger and tastier.

Some people make compost in special containers. Others pile it into heaps or in open wooden crates. It takes special conditions to make compost. There needs to be the right amount of heat, oxygen, and moisture. You will find out about these conditions when you make your own mini-composter in Activity 8.

What can go into compost? Leaves, soil, and grass clippings make a good base for compost. Straw and hay also work well. You can add vegetable and fruit peelings, coffee grounds, and tea leaves from the kitchen.

Compost piles can attract unwanted animals such as bugs, mice, or stray pets. To prevent this problem, food and yard waste must break down quickly. For this you must have the right conditions. It is important not to add meat, dairy, eggs, and bread products to compost piles.



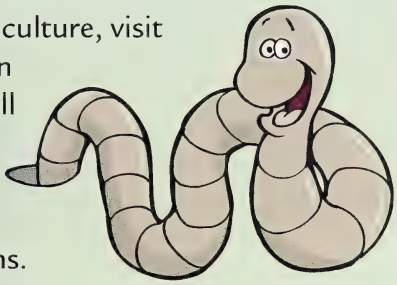
Recycling can reduce the amount of garbage you produce. Composting can make it shrink even more. Composting can help you grow healthy flowers and vegetables. Even if you don't have a garden, you can still compost. You can give the compost to someone who does have a garden or use it with indoor plants.

Imagine

Even people who live in apartments can compost. Vermiculture is a type of composting that uses red wriggler worms. People keep plastic tubs of soil under their sinks. They add fruit and vegetable scraps for the worms living in the tubs. The worms quickly eat through this garbage, and leave compost behind!

Composting with Worms (Vermiculture)

To discover more about vermiculture, visit the following website. Click on "Come Live With Me." You will see how to build a bed for a red wriggler worm. Tour the site to find out more interesting things about worms.



http://www.urbanext.uiuc.edu/worms/index.html

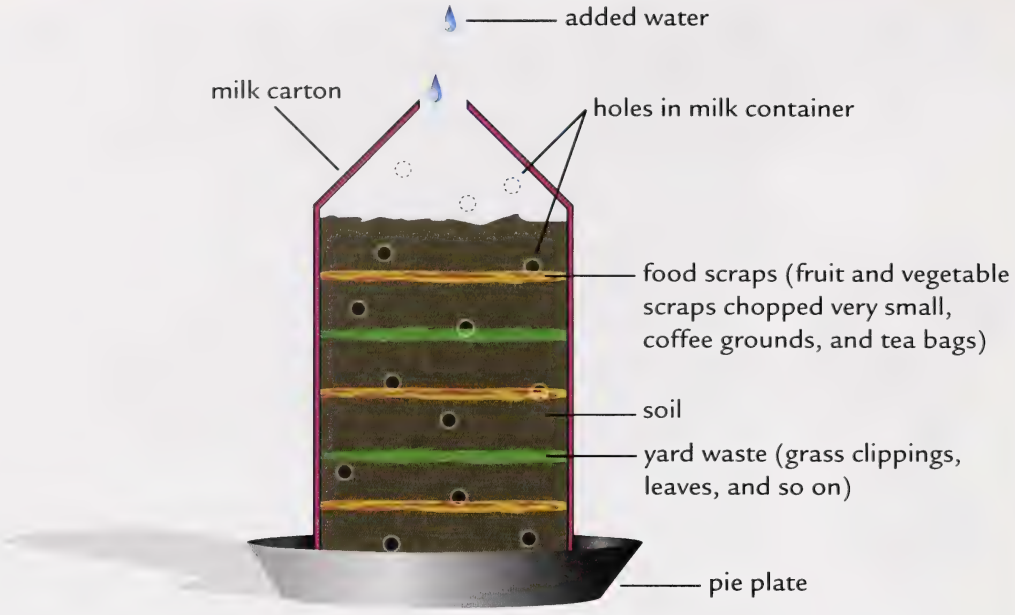
You can also do a search using "vermiculture" as your search term.

Activity 8: Making a Mini-Composter

Would you like to find out how to compost food and yard waste? You will make your own composter in this activity.

What you need

- a large, empty (waxed paper) milk carton
- a pen or large knitting needle
- a bowl or pie plate
- a stirring stick or wooden spoon
- garden soil (not potting soil)
- yard waste
- kitchen waste


added water
milk carton
holes in milk container
food scraps (fruit and vegetable scraps chopped very small, coffee grounds, and tea bags)
soil
yard waste (grass clippings, leaves, and so on)
pie plate

What to do

1. Rinse the carton to get rid of any milk. Open the carton carefully so that it can be re-closed if necessary. Use the pen or knitting needle to poke several holes in the sides and bottom of the carton.

2. Add some garden soil to the bottom of the carton. (You fill your composter in layers.) First add a layer of food scraps or yard waste on top of the soil. Sprinkle a bit of water on the waste and add a layer of soil. Repeat this until your composter is full (or you run out of scraps).

   Make sure that you do not pack the waste scraps too tightly or press the soil down too much. It is important that there are air spaces in the mixture. (**Hint:** If your family already has a compost pile, use its soil in your mini-composter. It will already contain lots of bacteria and even tiny worms that will help compost your scraps.)

3. Place the carton on the pie plate. Put your composter in a warm spot, such as a window sill or in front of a sunny window.

4. Stir or turn over the compost every two days or so. After one week, tip out the compost and see how things have changed.

5. Describe how the waste scraps have changed.

_____

_____

_____

6. Why do you think the composter needs to have holes in it?

_____

_____

7. Why do you think the composter needs to be warm?

_____

_____

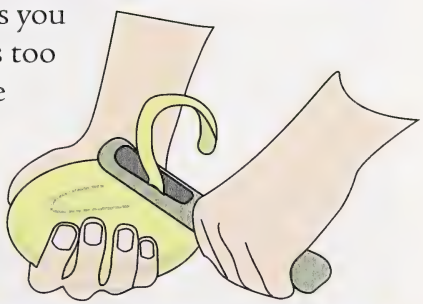
8. What would happen if you added worms to the composter?

_____

_____

Check your answers for this activity in the Suggested Answers at the end of this lesson.

Keep your composter going as long as you want. You will probably find that it is too small for all of the fruit and vegetable food scraps your family makes. Now is a good time to set up a composter in your yard or kitchen! You will help the environment by recycling your food scraps and yard waste.



Turn to Assignment Booklet 5B and complete question 8 of the Section 2 Assignment.

Suggested Answers

Activity 8: Making a Mini-Composter

5. Describe how the waste scraps have changed.

The small, thin scraps, such as lettuce, will probably have started to decay the most. Some scraps may even be gone after one week.

6. Why do you think the composter needs to have holes in it?

The holes will let air into the composter. The bacteria, worms, and other decomposers need air to survive and do their work.

7. Why do you think the composter needs to be warm?

Warmth helps the decomposers survive and work properly.

8. What would happen if you added worms to the composter?

Composting would happen more quickly. Worms eat the scraps, and their waste becomes part of the compost.

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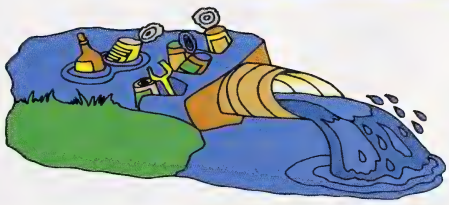
Lesson 9: Waste in Your Community

Why is dealing with waste the right way important? Your health depends on a clean environment. Today, you will find out how your community deals with waste. Each area has its own way of doing things.



Imagine

Wetlands (swampy or marshy areas) are one of nature's ways of recycling waste. Some plants in wetlands absorb waste and clean the water. The town of Bear River, Nova Scotia, has used this idea to treat its sewage. The town has used tanks, ponds, and a greenhouse to make a special sewage wetland. The plants help to clean the water. No chemicals are used.

How does your community handle the following things?

- reducing garbage
- collecting garbage
- treating waste
- recycling
- reducing pollution

Ask an adult to help you find this information. The activity and assignment will take up most of your time for this lesson.

Activity 9: My Landfill

What you need

- a pen
- paper
- rubber boots or other protective footwear

What to do

Ask your home instructor for help with this activity.

1. You will need an adult's help for this step. Find out where your local landfill or transfer station is. (A transfer station is a local depot where garbage is collected. From there it is moved to a landfill site.) You need to find out when the landfill or transfer station is open. A phone call to the landfill should get you that information. You may need to call the city, town, or county office instead.

Do not touch any garbage as it may be dangerous.

2. Visit the landfill or transfer station with an adult. Make notes on what you see there. **Note:** Read the questions in this Activity and in question 9 of Assignment Booklet 5B. This will help you take notes.

3. List several things that you saw at your landfill or transfer station.

_____

_____

_____

_____

_____

4. Fill in the following chart from your notes. List any items that could have been recycled, reused, or composted.

Recycle	Reuse	Compost

Check your answers for this activity in the Suggested Answers at the end of this lesson.

Did you see a lot of garbage during your visit? Can you guess how many waste disposal sites there are in Alberta? Imagine all the garbage that goes into them!

Think about these questions and your community:

- How can my community reduce the amount of garbage that goes into the landfill?

- How can people be encouraged to recycle, reuse, and compost more?

See if an adult can help you to visit a nearby sewage treatment plant.

Try to discover how your community treats grey water and sewage.

Turn to Assignment Booklet 5B. Continue your investigation of how your community deals with waste as you complete question 9 of the Section 2 Assignment.

Suggested Answers

Activity 9: My Landfill

3. List several things that you saw at your landfill or transfer station.

You might see some of these things at a landfill:

- garbage trucks dumping garbage
- people bringing their own garbage
- bulldozers or other machines burying garbage
- gulls, magpies, and crows picking at the garbage
- a fence to keep out large animals

You might see some of these things at a transfer station:

- piles of bagged household garbage
- collections of larger metal and wooden objects
- piles of tires
- collections of large appliances
- an attendant

4. Fill in the following chart from your notes. List any items that could have been recycled, reused, or composted.

Here is a sample answer. Your answers may be different. You can look back to Lessons 6, 7, and 8. They talk about what can be recycled, reused, or composted.

Recycle	Reuse	Compost
newspaper	old clothing	grass clippings
pop cans	furniture	leaves
glass	windows	branches
tires	plastic plant pots	fruit scraps
cardboard		vegetables
tin cans		

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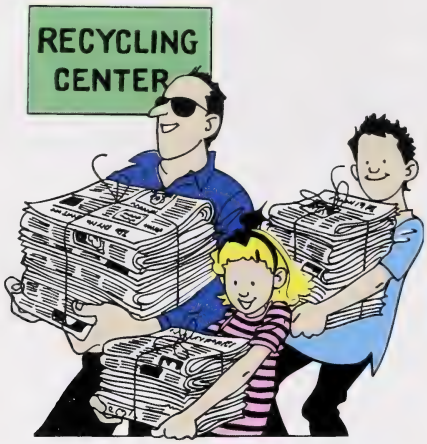
Lesson 10: The Environment and You

In this section, you
studied the world of waste.
You saw how waste affects Earth.
You found out how waste affects you.
Today, you will review the problems with waste, and you'll decide how you can help.

In the natural world, waste is not a problem. Decomposers break down autumn leaves. They make the soil richer for next year's growth. Everything is in balance. People make waste more quickly than nature can break it down. Some human-made things are not biodegradable. Nature cannot break them down. One example is plastic.

Pollution affects almost every part of our world. For a long time, humans did not see that pollution was a problem. We did not understand what we were doing. Today, people know how waste is hurting the world. This means that everyone's habits must change.

The three Rs are a good place to start. You have already looked at reducing, reusing, and recycling. Now you can make the three Rs part of your everyday habits. You may find that you cannot do as much as you would like to do. Sometimes it is hard to make recycling work. You may live too far from a recycling depot. Perhaps your home does not have space for a composter.



If it is hard to make recycling work, you can look for other solutions. Do you know someone who does have a compost pile? Could you give them your kitchen waste? They would probably love to take it! If you can't get to a recycling depot, what could you do? Perhaps you could try to reuse items as much as possible. You would still be reducing the amount of garbage you create.

Think of ways you can reduce waste. Did you include waste that you cannot see? Waste you cannot see includes air pollution from car exhaust, and water pollution from sewage or wasted water. Mostly people think of waste they can see. Waste you can see includes bottles, cans, and newspapers. Always remind yourself about unseen waste too.

Remember that the three Rs—reduce, reuse, recycle—apply to all of the things you use.

Activity 10: My Plan

What you need

- your Personal Action Plan to Reduce Water Usage from Lesson 3 (Section 1 Assignment, question 3)

What to do

In your Personal Action Plan to Reduce Water Usage, you chose some methods to reduce water usage. Look back at your Personal Action Plan to read what you wrote.

1. Was your plan an activity that helped to reduce water waste? If so, what was your plan?

_____

_____

_____

_____

2. Have you been able to do this activity? Explain.

_____

_____

3. Your Personal Action Plan to Reduce Water Usage dealt only with reducing water waste. It didn't include ideas to help reduce other forms of waste. It's time to record your ideas for reducing other forms of waste. Make sure you can actually do what you suggest. What are your ideas to help reduce other forms of waste?

4. How will your ideas help the environment, plants, and animals?

5. You need to get permission to carry out your ideas. Who can give you permission?

6. What things do you need to carry out your ideas?

7. Choose one of your ideas. List the exact steps that you will follow to make the idea work.

8. How will you know if your plan has helped to reduce waste?

_____

_____

Check your answers for this activity in the Suggested Answers at the end of this lesson.

Imagine that every person made a Personal Action Plan to Reduce Waste. Imagine the effect this would have on Earth's pollution problems. You can make a difference. Think of what a difference many people could make!

I save natural resources—oil and gas.

I compost the grass clippings. I put less garbage in the landfill.

I get more exercise. I don't breathe exhaust fumes. I don't listen to a loud motor. I am healthier!

A manual lawn mower is a simpler machine than one that has a motor. Many of its parts can be recycled.

Turn to Assignment Booklet 5B and complete question 10 of the Section 2 Assignment.

Suggested Answers

Activity 10: My Plan

1. Was your plan an activity that helped to reduce water waste? If so, what was your plan?

Answers will vary. Your ideas were likely different. Here are some sample ideas:

- Take a shorter shower.
- Repair any leaky taps as soon as possible.
- Turn off the tap while brushing your teeth.
- Wash the car using water in a bucket instead of a running hose.
- Put a jug of water in the fridge for cool drinking water. (This saves all the water you'd run to get cool water from the tap.)

2. Have you been able to do this activity? Explain.

You may or may not have been able to do this activity. If not, what are some other ideas that you will be able to carry out?

Your ideas may be different. These are some other ideas for saving water:

- Wash only full loads of laundry.
- Use water from washing dishes to water plants.
- Use a rain barrel to collect rainwater for watering plants.
- Water the garden using a watering can instead of a sprinkler.

3. Your Personal Action Plan to Reduce Water Usage dealt only with reducing water waste. It didn't include ideas to help reduce other forms of waste. It's time to record your ideas for reducing other forms of waste. Make sure you can actually do what you suggest. What are your ideas to help reduce other forms of waste?

There were many ideas for ways you could help reduce waste in this section. These are some ideas:

- Ride your bike more.
- Set up a kitchen or garden composter.
- You could use both sides of sheets of paper.
- Ask for car rides less often. Walk or ride your bike.
- Turn off the television set or computer and play games outside(remember, televisions use electricity).

You will probably have other great ideas.

4. How will your ideas help the environment, plants, and animals?

Everything people do affects the land, water, air, plants, and animals. You may have some helpful ideas. For example, don't litter. Animals won't get sick from eating your garbage or wrappers.

5. You need to get permission to carry out your ideas. Who can give you permission?

Your parents, guardian, or adult helper should know the steps you are going to take.

6. What things do you need to carry out your ideas?

This will depend on your idea. Most actions need no special equipment. You may need boxes if you want to recycle papers and cans. You may want to build a big composter.

7. Choose one of your ideas. List the exact steps that you will follow to make the idea work.

Here is a sample answer. Your answer will likely be different.

- Discuss your ideas with an adult.
- Research your idea. For example, call the city office to find out about recycling in your community. You may need adult help with this.
- List any special equipment you need. You may need big boxes or containers.
- Construct or organize any special areas or objects.
- Begin following your plan.

8. How will you know if your plan has helped to reduce waste?

Here is an example. You tried to reduce your use of electricity. Did you use less electricity? (This is often listed on the power bill for your home.) You tried to recycle, reuse, reduce, and/or compost. Did your family produce less garbage? You may notice that fewer garbage bags are used each week.

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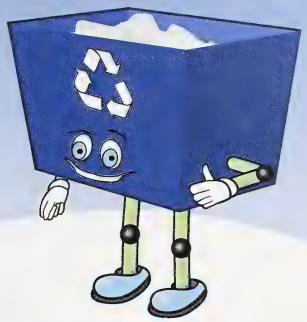
Section 2



Conclusion

In this section, you explored the problem of pollution and how you can help. You have many ideas that you can try to help reduce the waste in your home and community. Just remember the three Rs: reduce, reuse, and recycle.

Have you shopped at a farmer's market? It is like shopping long ago. There is almost no packaging. You can use your own shopping bag or knapsack to hold the items you buy. Recycled bags are also used.

Optional Follow-up Activities

Activity 1: Think Globally, Act Locally

People often use the phrase, "Think globally, act locally." Thinking globally means that you think about the entire planet and all of the people, plants, and animals on Earth. What do you think it means to act locally? Can you give an example of how you "think globally and act locally"?

Activity 2: Pollution Solutions

Is there an important pollution issue in your community? Perhaps you have no recycling depot, or the nearby lakes are becoming unsafe for swimming. Write a letter to your local government officials to explain your concerns about the problem.

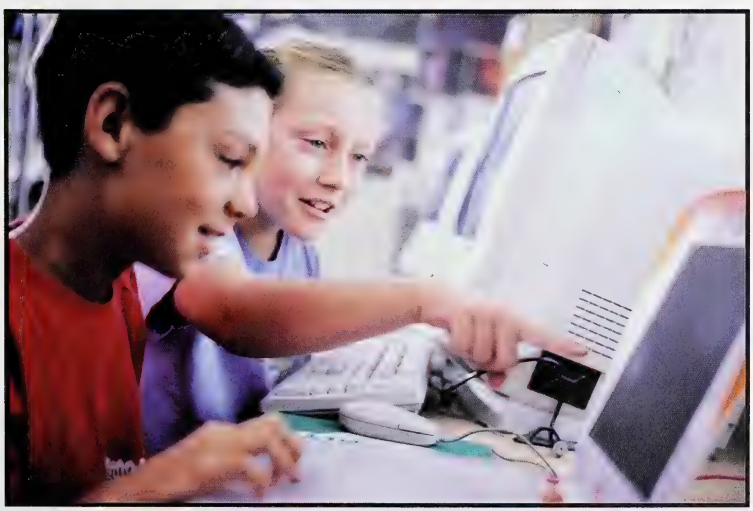
Activity 3: Masses of Packaging

Just how much packaging do you throw away every week? For one week, collect all of the packaging that you would have thrown in the garbage. At the end of the week, weigh the garbage. Is any of it recyclable? Could some be reused? Could some items be bought with less packaging or packaging that could be recycled?

Activity 4: Waste Management

Take a fun look at managing waste. Visit Edmonton's household waste system website.

http://www.sortitout.ca/online.html



Module Summary

In order for Canada to have a safe and clean environment, each person can help. By using the three Rs—reduce, reuse, and recycle—Canadians can lower the amount of pollution and waste in the country. You can make a difference!

Now turn to Assignment Booklet 5B to complete the Student Feedback questions. Then go to the Checklist for Section 2. Make sure you have collected everything on the Checklist to send to your teacher.

Glossary

acid rain: rain (or snow) that has become a weak acid by mixing with air pollution

biodegradable: capable of being broken down or decomposed

compost (v.)**:** to turn organic matter into soil-like material full of nutrients

decay: to rot and break down

decomposer: an organism that feeds on the waste and dead tissues of other organisms

disposable: designed to be used once and then thrown away

E. coli: a bacteria found in humans and cattle

environment: all of the surroundings and conditions that affect the growth and development of living things

greenhouse gas: a gas that traps heat and causes global warming

grey water: water that drains from sinks and tubs

landfill: a place where garbage is buried

manure: animal waste

methane: a greenhouse gas

middens: garbage disposal sites

organic matter: material that occurs naturally, such as wood, straw, hair, skin, fur, and bone

packaging: plastic, foil, and paper wrapping around items for sale

pollute: put damaging waste into the land, air, or water

processing: handling in a special way

recycle: to process a used item so the materials that were used to make it can be reused

reduce: use less

run-off: excess water that drains into creeks, lakes, and rivers

sewage: waste that passes through sewers or into a septic system

sewer: underground pipes that carry waste water

source: the place from which anything comes

toxic: poisonous

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